



MB5 MIMO

Beamforming Test System

User Manual

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Safety Summary

If the equipment is used in a manner not specified by the manufacturer the protection provided by the equipment may be impaired.

Safety Symbols

The following safety symbols are used throughout this manual and may be found on the instrument. Familiarize yourself with each symbol and its meaning before operating this instrument.



Instruction manual symbol. The product is marked with this symbol when it is necessary for you to refer to the instruction manual to protect against damage to the instrument.



Protective ground (earth) terminal. Used to identify any terminal which is intended for connection to an external protective conductor for protection against electrical shock in case of a fault, or to the terminal of a protective ground (earth) electrode.



Indicates dangerous voltage (terminals fed from the interior by voltage exceeding 1000 volts must be so marked).



Frame terminal. A connection to the frame (chassis) of the equipment which normally includes all exposed metal structures.



The caution sign denotes a hazard. It calls attention to an operating procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product or your data.



Alternating current (power line).

Résumé des règles de sécurité

Si le matériel est utilisé d'une façon non conforme aux spécifications du constructeur, la protection assurée par le matériel peut être mise en défaut.

Symboles de sécurité

Les symboles suivants sont utilisés dans tout le manuel et peuvent être trouvés sur le matériel. Il est recommandé de se familiariser avec chaque symbole et sa signification avant de manipuler le matériel.



Symbole « manuel d'instruction ». Ce symbole apparaît sur le produit lorsqu'il est nécessaire de se référer au manuel d'instruction pour éviter une détérioration du matériel.



Masse. Ce symbole identifie une connexion au châssis du matériel (ce châssis inclut normalement toutes les structures métalliques exposées).



Terre : ce symbole identifie la connexion de terre chargée de protéger le matériel contre les chocs électriques. Cette connexion doit être raccordée vers un conducteur externe de protection ou vers une électrode de type terre.



Ce symbole désigne une opération ou une condition dite « sensible », qui, si elle n'est pas correctement réalisée, pourrait entraîner de sérieuses détériorations au matériel ou aux données utilisateur.



Ce symbole indique un voltage dangereux (connexion alimentée en interne par un voltage excédant 1000 volts).



Courant alternatif (ligne de puissance).

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1. Introduction

1.1. Overview

This document provides detailed information on how to use the MB5 MIMO Beamforming Test System.

The system consists of the following:

- Two (2) VR5 Channel Simulators in an 8x2 bi directional MIMO configuration
- One (1) VR5-8600 RF Interface Unit
- One (1) Cisco switch
- One (1) supporting laptop computer
- One (1) Network Analyzer (user supplied)

The 8600 provides the capability for summing and/or splitting downlink and uplink RF paths to enable bidirectional operation. The Beamforming Test System has eight RF ports for connections to base station (NodeB), or network emulator antenna ports, and two RF ports for connections to User Equipment (UE) antenna ports. The system is controlled by a computer.

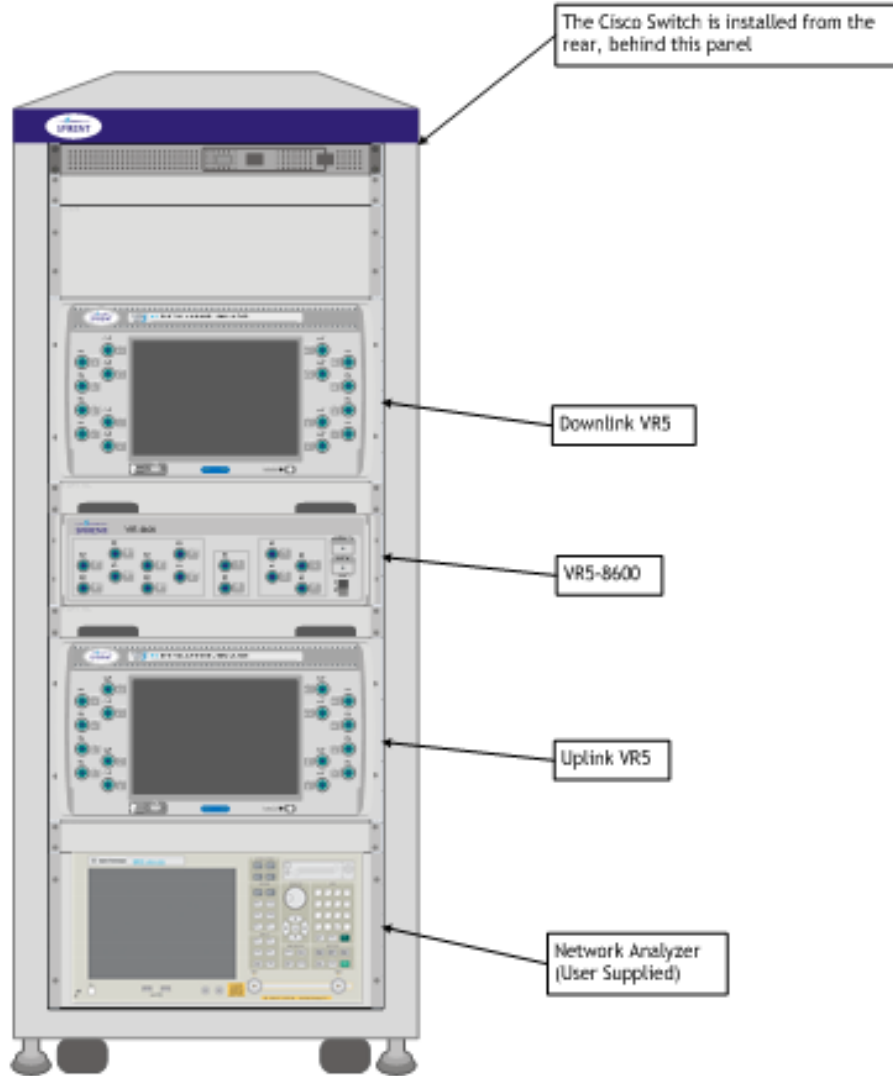


Figure 1-1: 8x2 MIMO Beamforming Test System Rack

2. Setting Up the Test System

2.1. Overview

The Setup Guide (document Part Number: 71-006708) provides complete wiring connections for the 8x2 MIMO configuration.

The system consists of the following components:

- Two (2) VR5 Channel Simulators in an 8x2 bi directional MIMO configuration
- One (1) VR5-8600 RF Interface Unit
- One (1) Cisco switch
- One (1) supporting laptop computer
- One (1) Network Analyzer (user supplied)

An overview of the key connections is shown Figure 2-1.

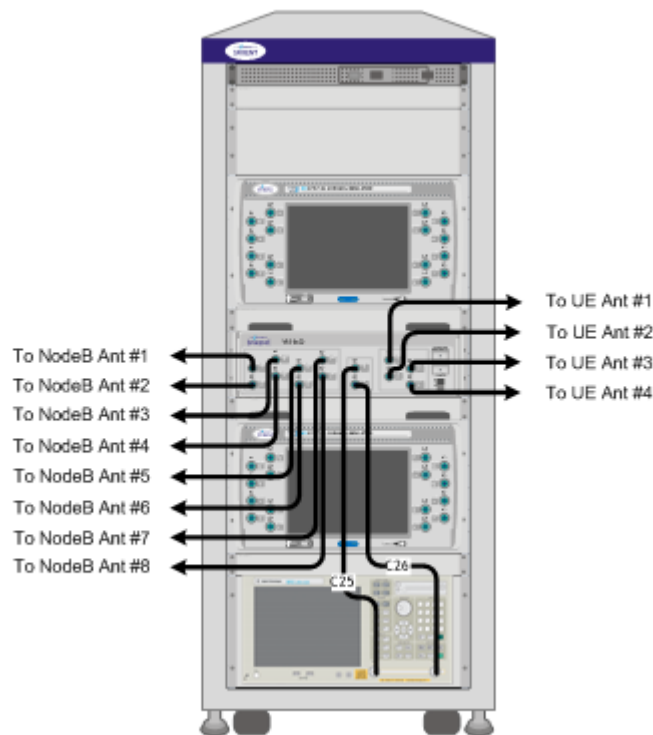


Figure 2-1: Rack Connections

2.2. Connections and Power

1. Ensure that all Ethernet, RF cables, and Sync cables are connected as shown in the Setup Guide.
2. Turn on the rack. The power switch is located under an access door on the top right of the rack, as shown in Figure 2-2.

Switch Access
Door Closed



Open



Figure 2-2: Rack Power Switch

3. Ensure that the rack exhaust fans are running. Wait three minutes for the SYST and STAT LED to illuminate steady green on the Cisco switch.
4. Power-on the system in the following order:
 - a. VR5-8600
 - b. User-supplied Network Analyzer
 - c. VR5 Unit #1
 - d. VR5 Unit #2
 - e. Controller Laptop
5. Wait for the laptop operating system to load and log in.
6. Ensure that the laptop IP address is set to the **192.168.0.xxx** subnet.
7. If the IP addresses for the VR5 instruments are not configured, follow the instructions in Chapter 3. If the test setup is already configured, proceed to Chapter 4 on page 15.

2.3. Ventilation

For proper ventilation, ensure that the rack is located in an area with the following conditions:

- A minimum of eighteen (18) inches of space between the sides of the rack and any objects that may restrict air flow. For example, a wall, cabinet, or another rack.
- A minimum of twelve (12) inches of space between the rear door and any object that may restrict air flow. For example, a wall, cabinet, or another rack.
- Make sure there is nothing that blocks the airflow from the exhaust fans on the top of the rack.
- Do not allow other equipment to exhaust into the rack, as this may cause the equipment to overheat.
- If insufficient ventilation is provided, the equipment in the rack may overheat. This can cause improper operation.

3. Configuring the Test System

3.1. Overview

This chapter describes the configuration of the MIMO Test System. It involves setting the IP addresses of the primary and secondary VR5 units, and the user-supplied network analyzer and then testing those connections using the VR5 Spatial Channel Emulator software running on the control computer.

The network configuration is shown in Figure 3-1.

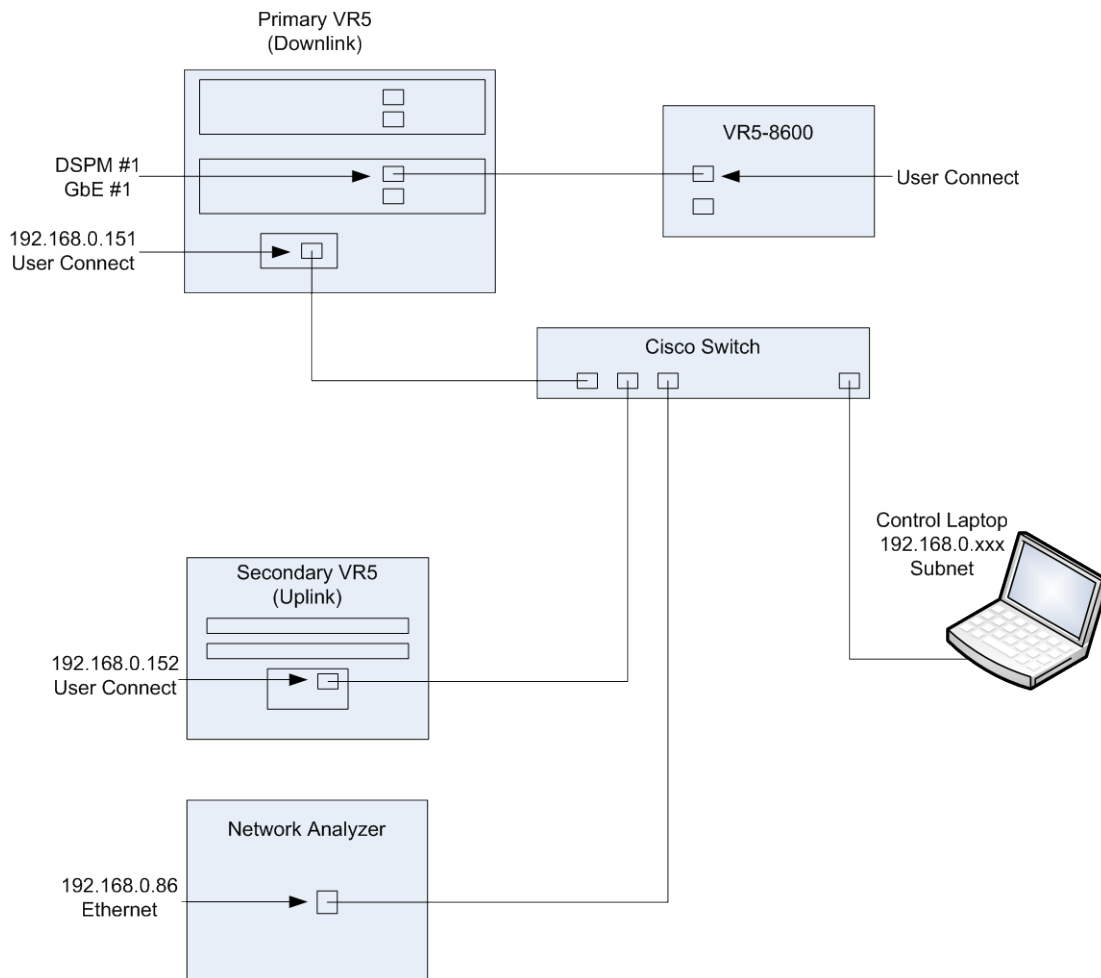


Figure 3-1: Network Configuration

3.2. Configuring IP Addresses of Test Equipment

The following sections describe the IP address configuration for the test equipment illustrated in Figure 3-1.

3.2.1. Configuring the Primary VR5

1. Ensure the primary VR5 HD Spatial Channel Emulator is powered-on.
The *VR5 Main* window displays, as shown in Figure 3-2.

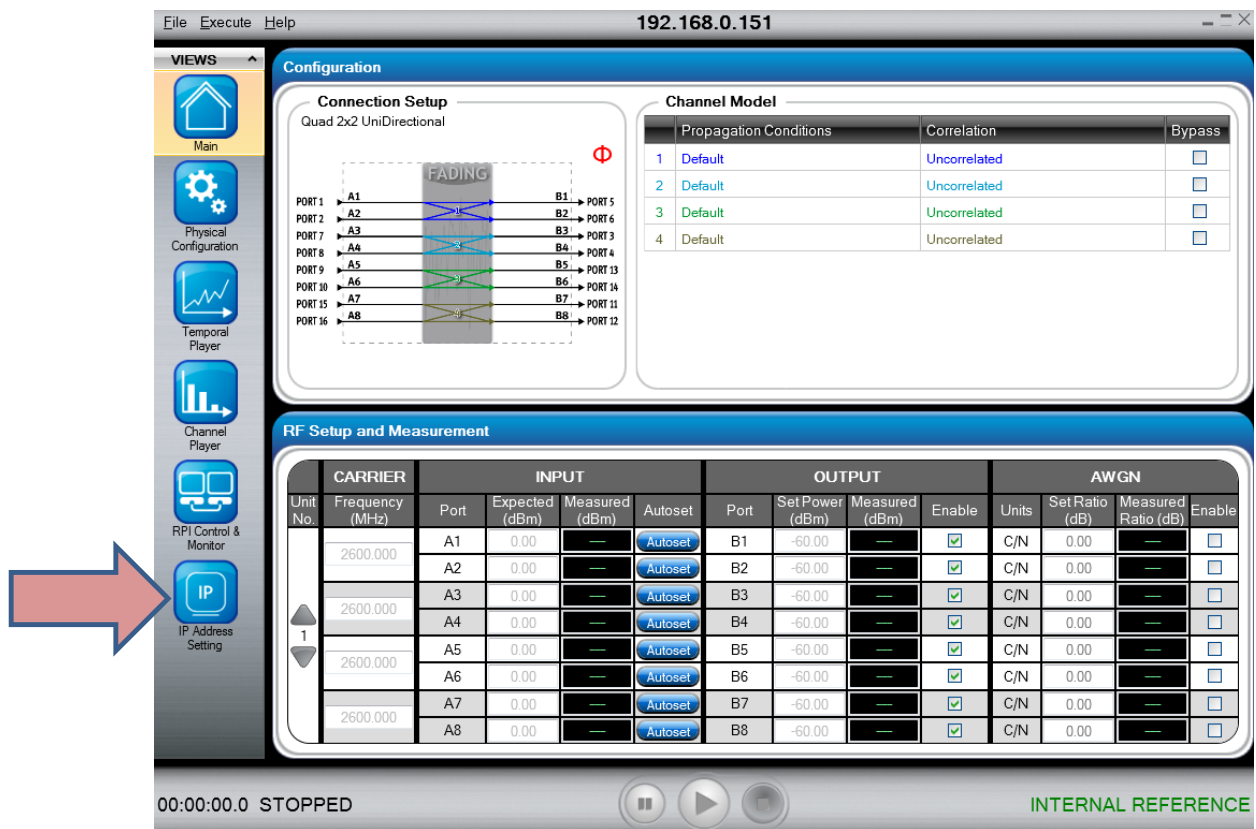


Figure 3-2: VR5 HD Spatial Channel Emulator Main Window

2. Using the touch screen interface, select the **IP Address Setting** button shown in Figure 3-2.
The *IP Address Setting* window displays, as shown in Figure 3-3.

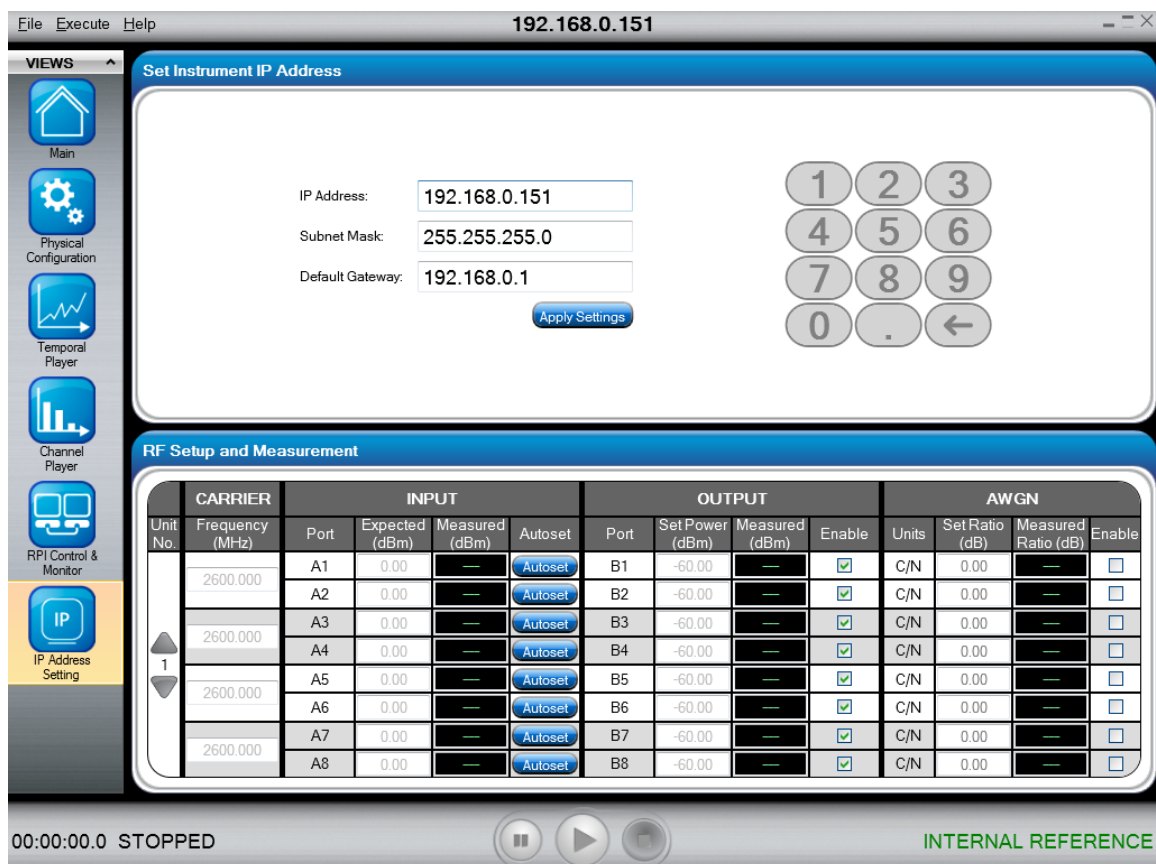


Figure 3-3: IP Address Setting Window

3. In the *IP Address* field, enter **192.168.0.151**.
4. Ensure that the *Subnet Mask* and *Default Gateway* settings are configured as shown in Figure 3-3.
5. Click the **Apply Settings** button.
6. Click the **Main** button, as shown in Figure 3-4.
The VR5 Main window displays, as shown in Figure 3-2.

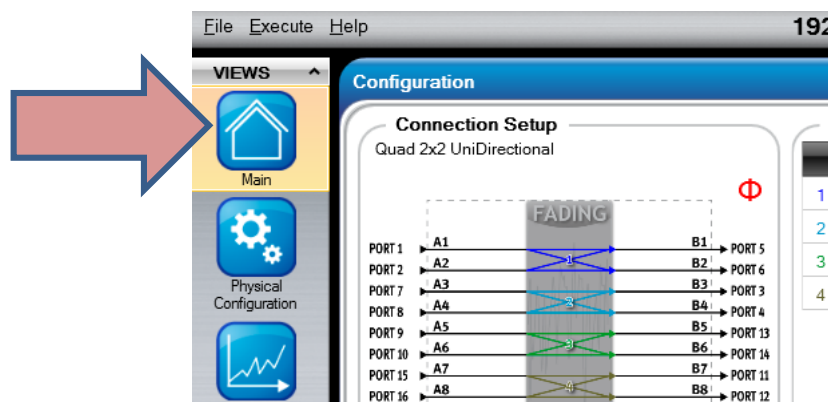


Figure 3-4: Selecting Main View on VR5

3.2.2. Configuring the Secondary VR5

Using the touch screen interface on the secondary VR5 unit, repeat the steps in the Section 3.2.1 on page 7 and enter the following settings:

- IP Address: **192.168.0.152**
- Subnet Mask: **255.255.255.0**
- Default Gateway: **192.168.0.1**

3.2.3. Configuring the Network Analyzer

Set the IP address of the user-supplied Network analyzer to: **192.168.0.86**.

Ensure that Telnet Server is enabled. Refer to the manufacturer documentation for the network analyzer for further information.

3.3. Configuring VR5 HD Spatial Channel Emulator Control Software

NOTE: Ensure that the control laptop IP address is set to **192.168.0.xxx** subnet.



Figure 3-5: VR5 HD Spatial Channel Emulator Software Icon

1. On the Controller Laptop, launch the VR5 HD Spatial Channel Emulator control software by clicking the icon shown in Figure 3-5.
The *VR5 Spatial Channel Emulator Window* displays, as shown in Figure 3-6.



Figure 3-6: VR5 HD Spatial Emulator Start Window

2. In the *Primary VR5 IP Address* field, enter **192.168.0.151**.
3. Click the **Connect** button.
4. The *VR5 HD Main* window displays, as shown in Figure 3-7.

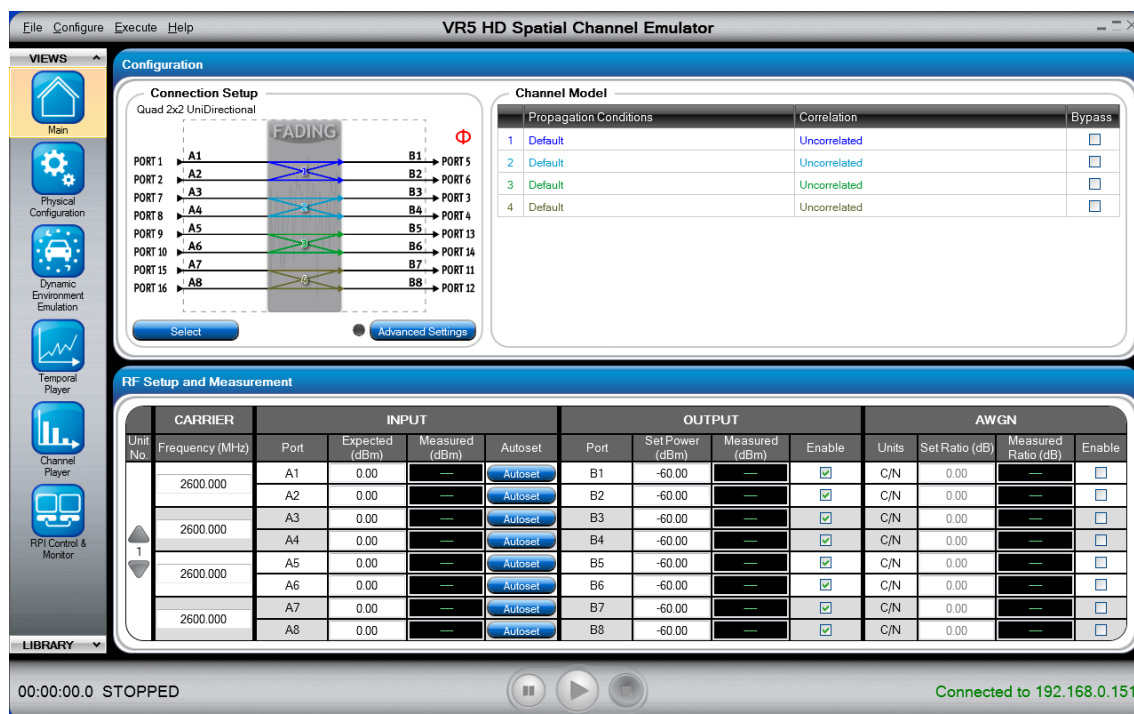


Figure 3-7: VR5 HD Main Window

- To connect the secondary unit, select **Configure>Additional VR5 Instruments**, as shown in Figure 3-8.

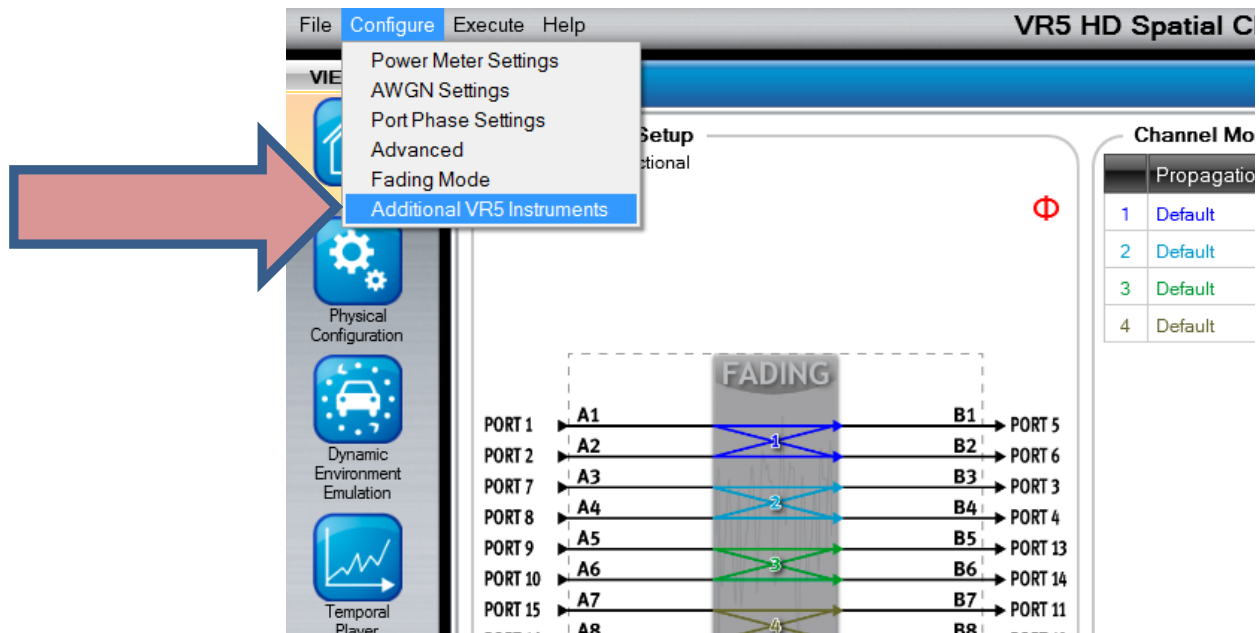


Figure 3-8: Configuring Additional VR5 Instruments

- The *Additional VR5 Instruments* window displays, as shown in Figure 3-9.

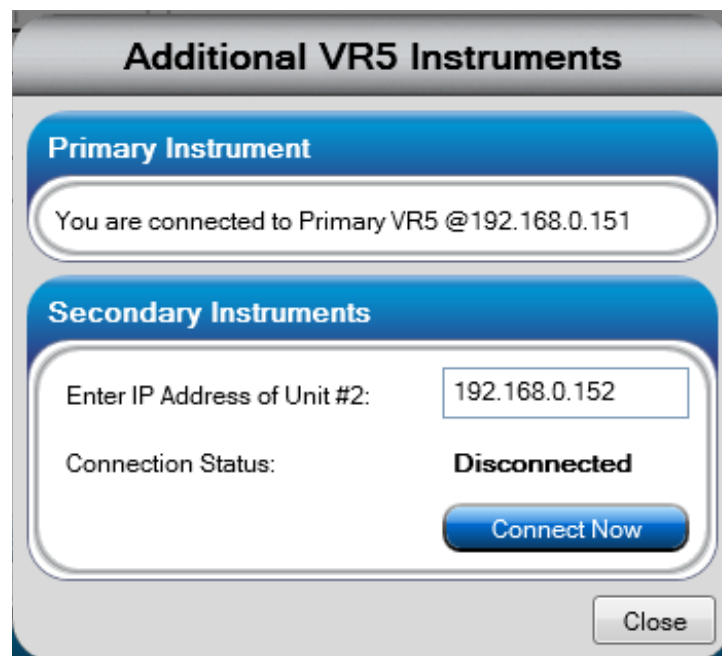


Figure 3-9: Additional VR5 Instruments Window

- In the *Enter IP Address of Unit #2* field, enter the IP address of the secondary VR5 unit: **192.168.0.152**.
- Click **Connect Now**.

9. A message displays, as shown in Figure 3-10.

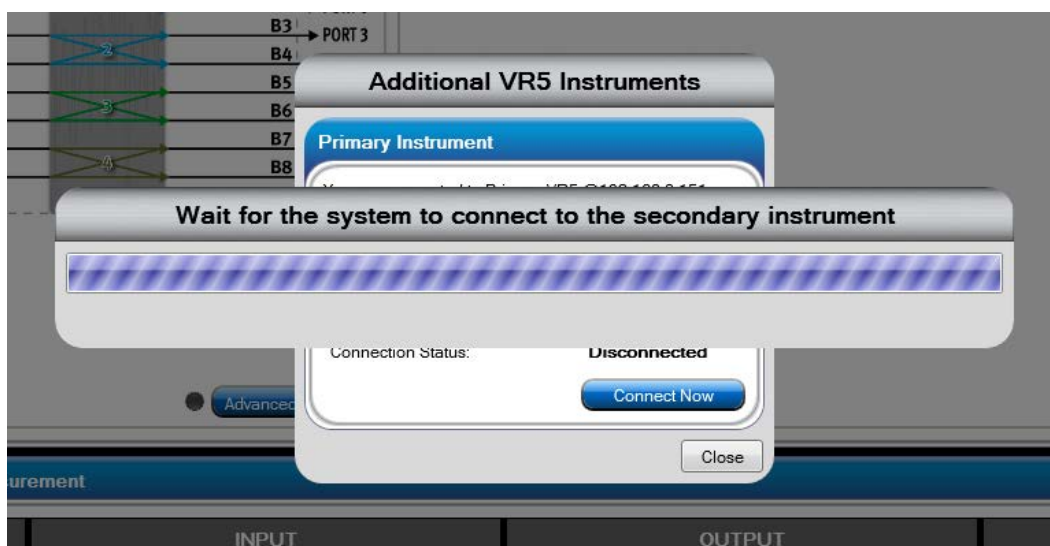


Figure 3-10: Connecting to Secondary Instrument Message

10. When the connection is successfully completed, the *Additional VR5 Instruments* window displays, as shown in Figure 3-11.

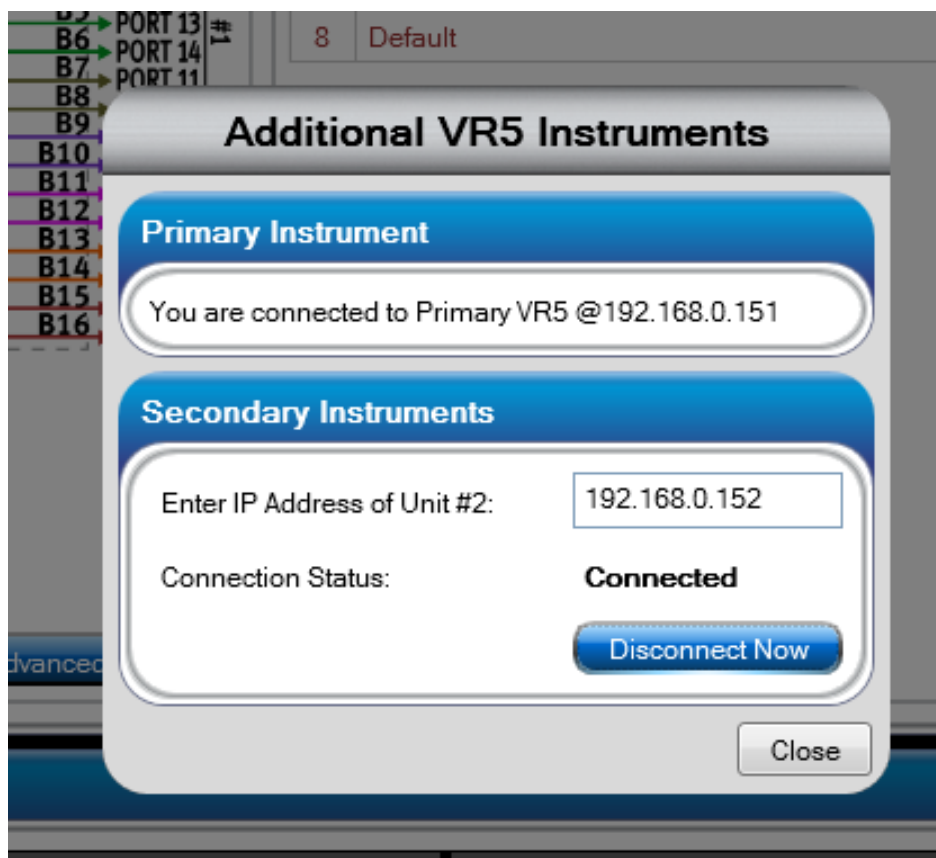


Figure 3-11: Additional VR5 Instruments

11. Click **Close**.

12. Connect the user-supplied network analyzer by selecting **Execute>Phase Calibration>Network Analyzer Setting**, as shown in Figure 3-12.

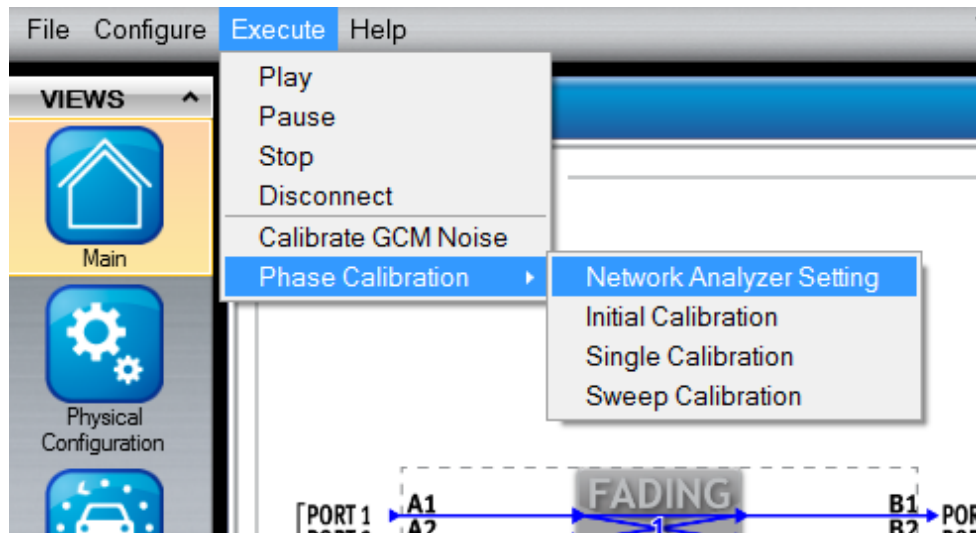


Figure 3-12: Connecting the Network Analyzer

13. The *Network Analyzer Settings* window displays, as shown in Figure 3-13.

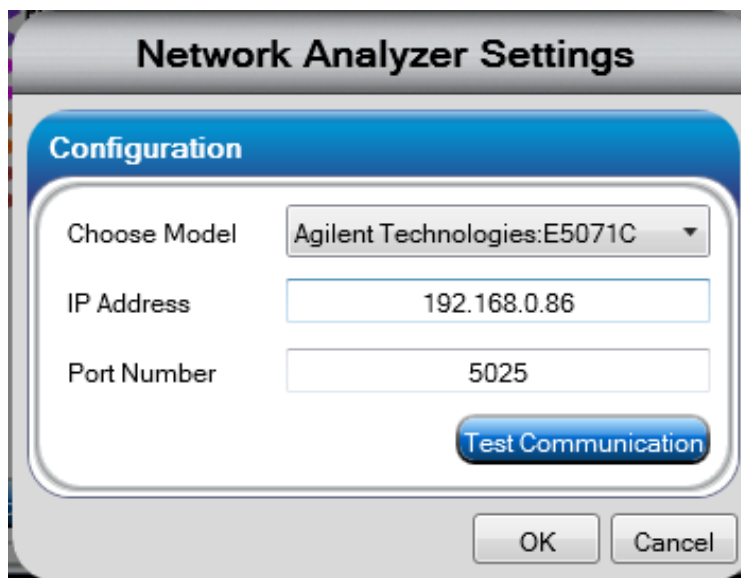


Figure 3-13: Network Analyzer Settings Window

14. In the Choose Model field, select your network analyzer from the menu. This example uses the Agilent Technologies: E5071C, a message displays, as shown in Figure 3-14.

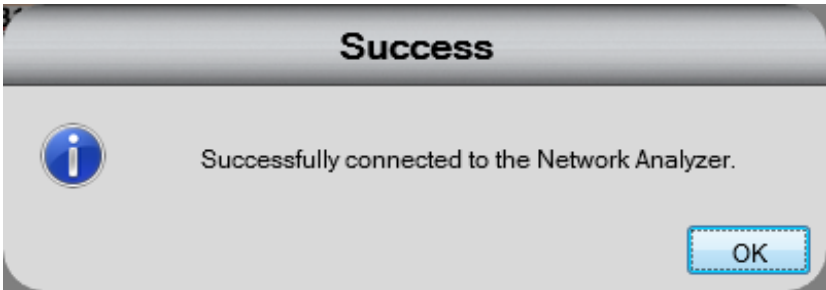


Figure 3-14: Network Analyzer Test Success Message

- 15. Click OK.
- 16. The VR5 HD Main window displays, as shown in Figure 3-15.

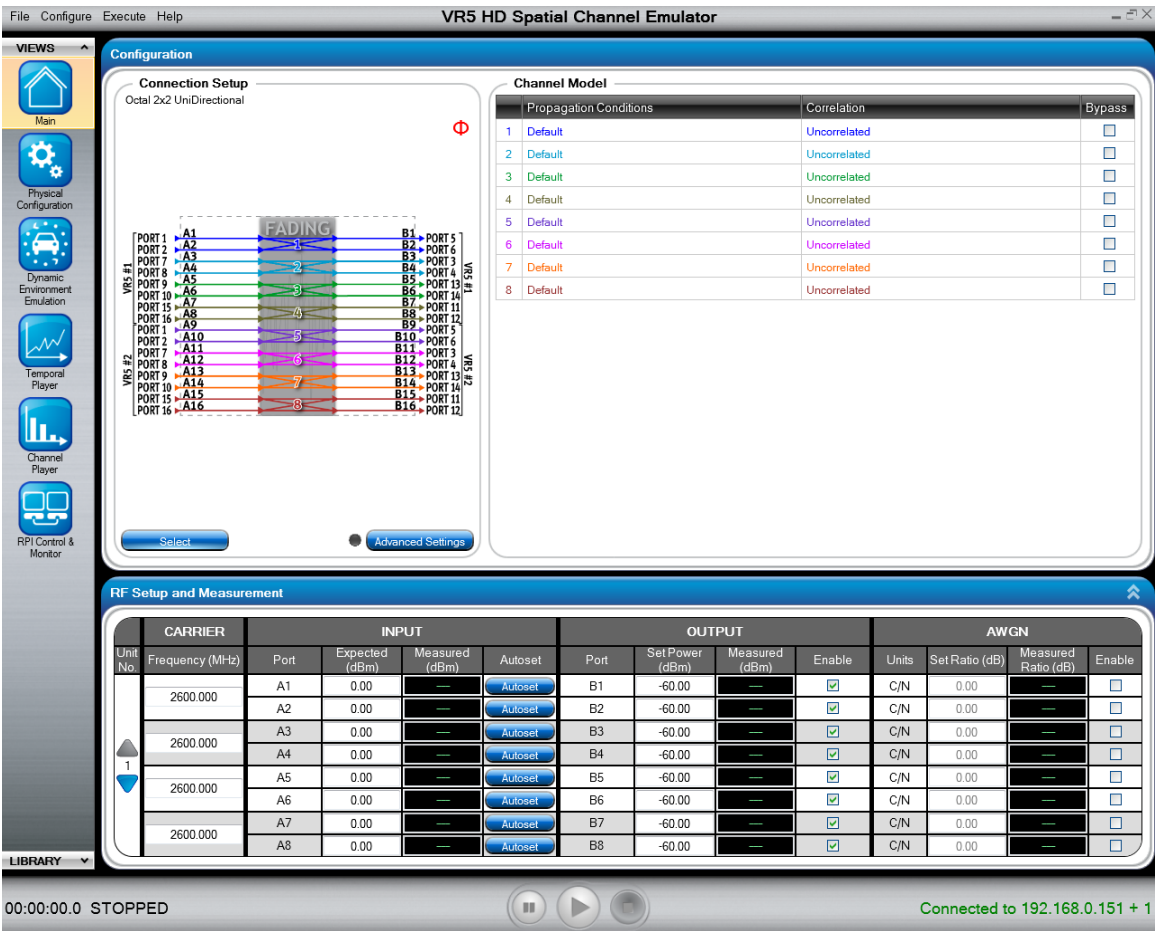


Figure 3-15: VR5 HD Main Window

The MB5 MIMO Beamforming Test System is now configured for use.

4. Using the Test System

4.1. Overview

Figure 4-1 shows the functional block diagram of the 8x2 Beamforming Test System.

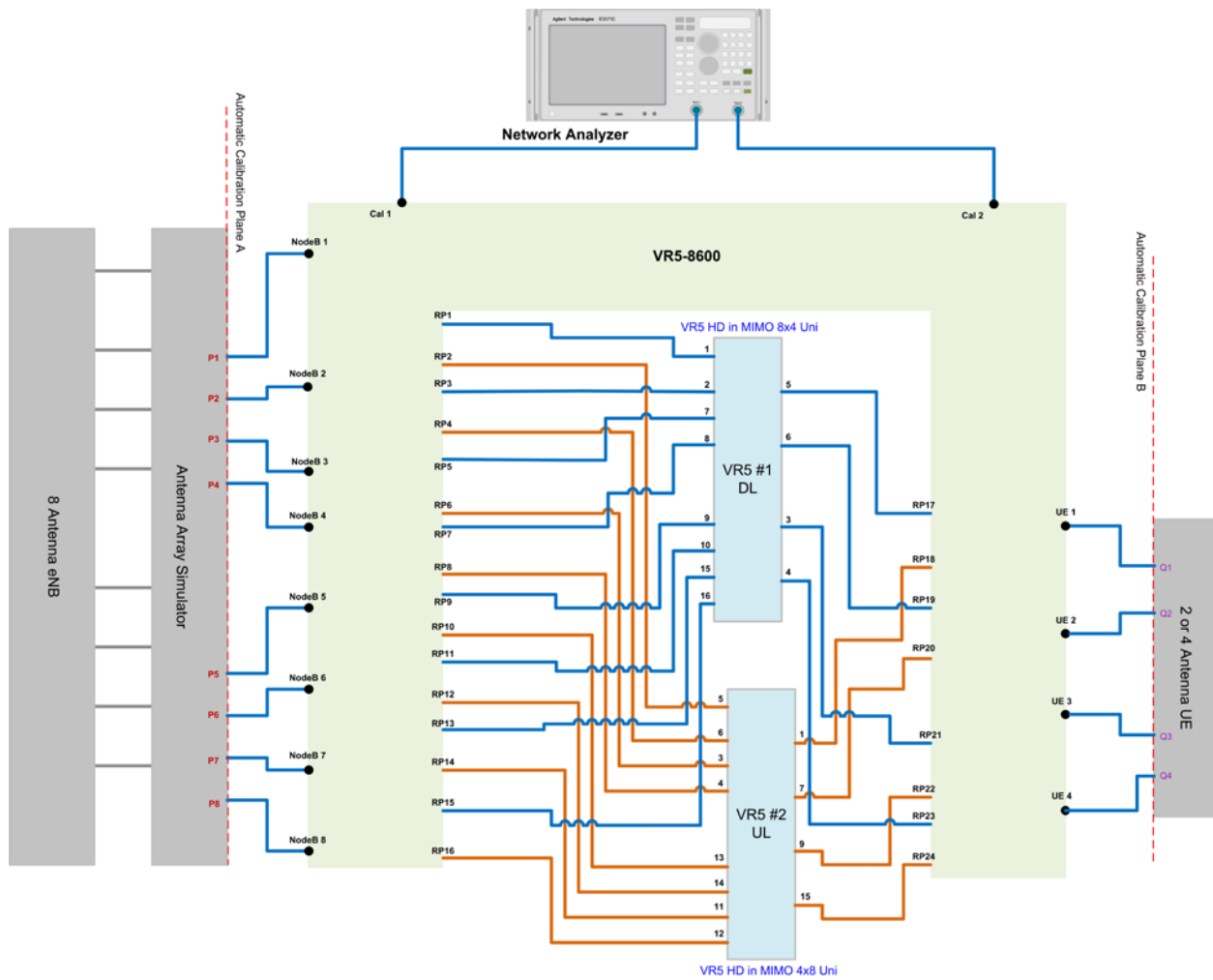


Figure 4-1: 8x2 Beamforming Test System Diagram

4.2. Phase Calibration

The phase calibration procedure includes two parts:

1. **Initial:** Calibrates the cables used in the test setup. After this procedure is performed, it does not have to be repeated as long as the cables are not changed.
2. **Automatic:** Must be performed before each selected test.

The following sections describe Initial and Automatic Calibration for the 8 x 2 BiDirectional configuration.

4.2.1. Initial Calibration, 8X2 BiDirectional

NOTE: You must perform the Initial Calibration each time cables in the test setup are changed.

1. On the Control laptop, launch the VR5 HD Spatial Channel Emulator control software by clicking the icon shown in Figure 4-2.



Figure 4-2: VR5 HD Spatial Channel Emulator Software Icon

2. The *VR5 HD Spatial Emulator Start* window displays, as shown in Figure 4-3.



Figure 4-3: VR5 HD Spatial Emulator Start Window

3. Click **Connect**.
4. The *VR5 HD Main* window displays, as shown in Figure 4-4.

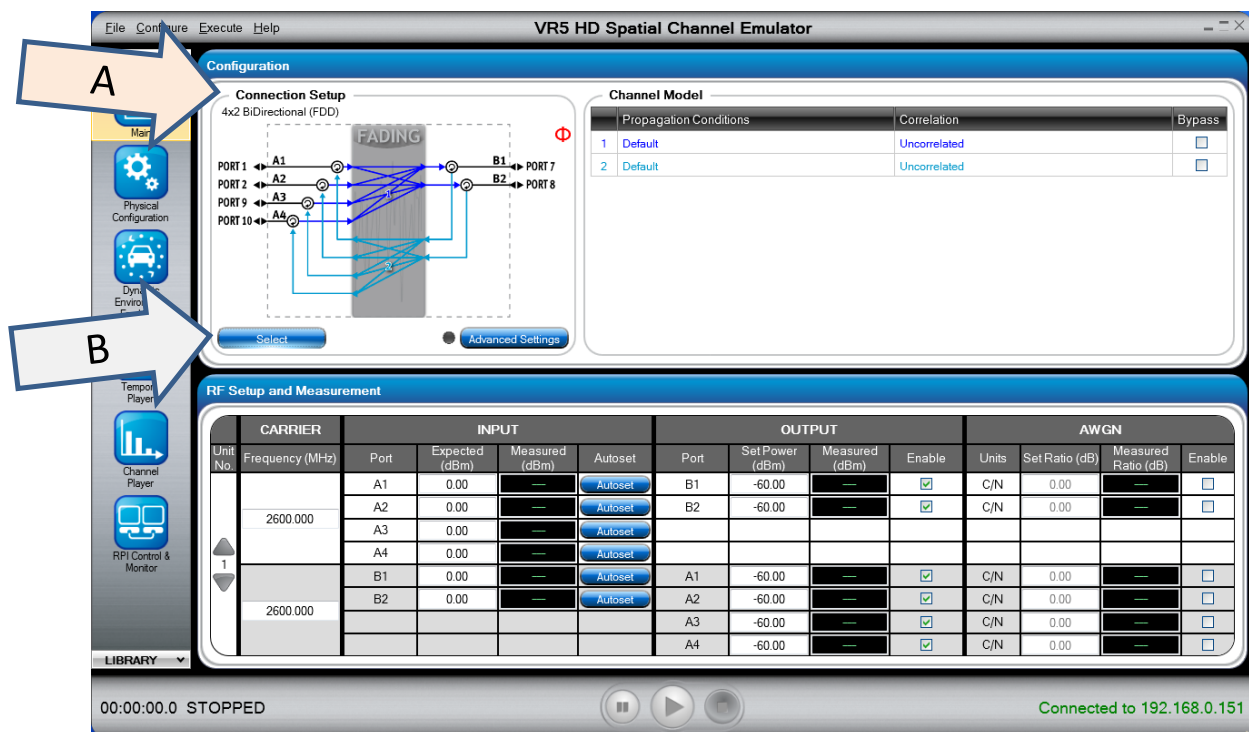


Figure 4-4: VR5 HD Main Window

5. Under the Connection Setup section, select the **8X2 BiDirectional-8600 (TDD)** test, as shown in Figure 4-4.
6. If a different Connection Setup is displayed, click **Select** to choose the correct test. The *Connection Setup Selection* window displays, as shown in Figure 4-5.

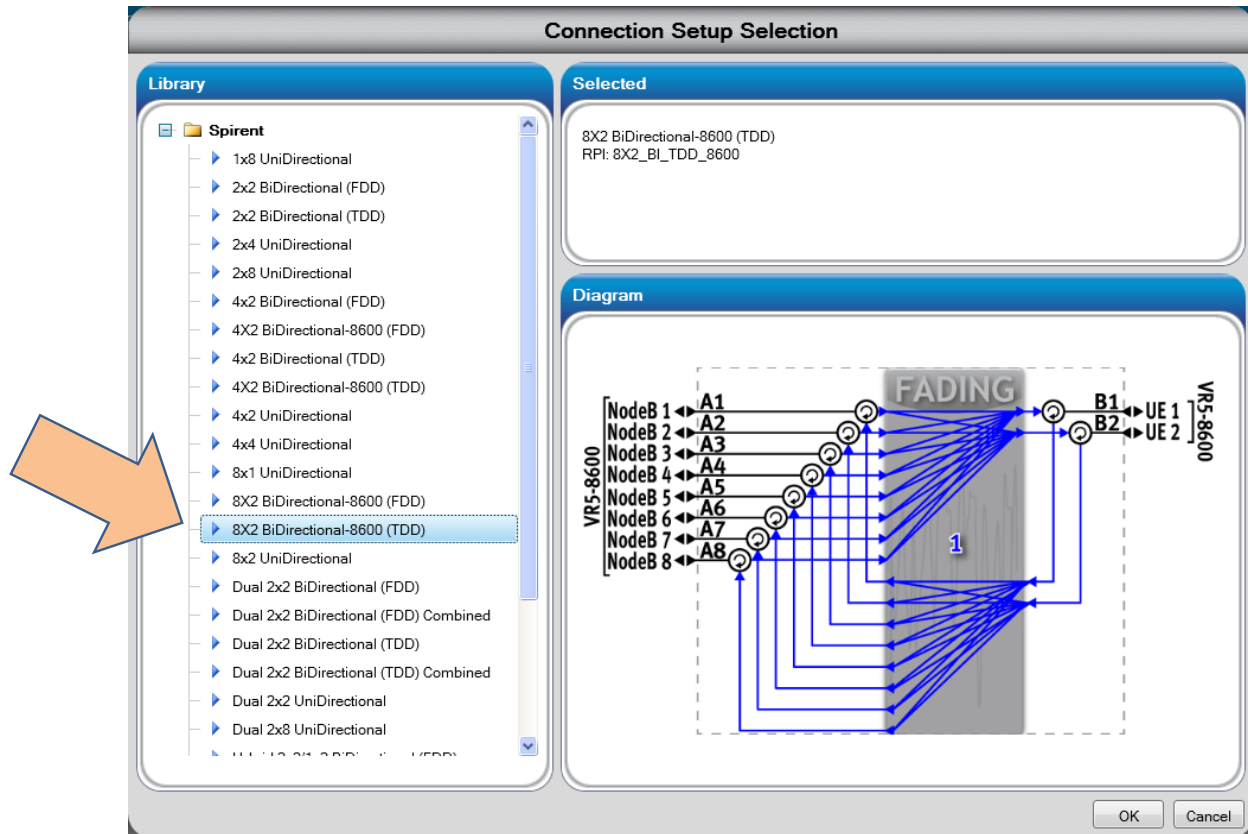


Figure 4-5: Connection Setup Selection Window

7. Select **8X2 BiDirectional-8600 (TDD)**, as shown in Figure 4-5.
8. Click **OK**.

NOTE: Not all test setup configurations require two VR5 instruments.

9. If the error message in Figure 4-6 displays, refer to Section 3.3, Configuring VR5 HD Spatial Channel Emulator Control Software on page 9 to configure additional VR5 instruments.

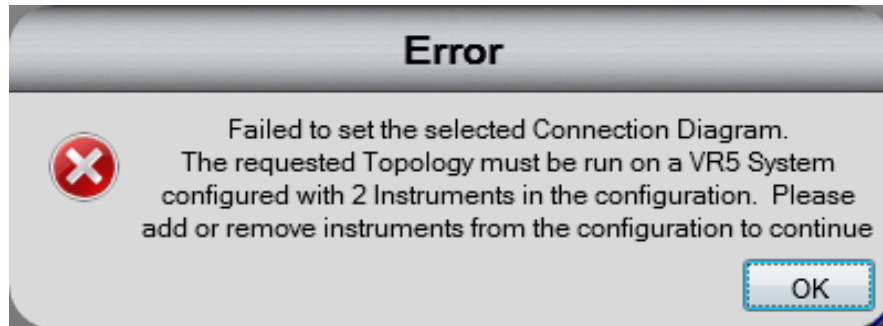


Figure 4-6: Configuration Error

10. If everything is properly configured click **OK**.
The message in Figure 4-7 displays.

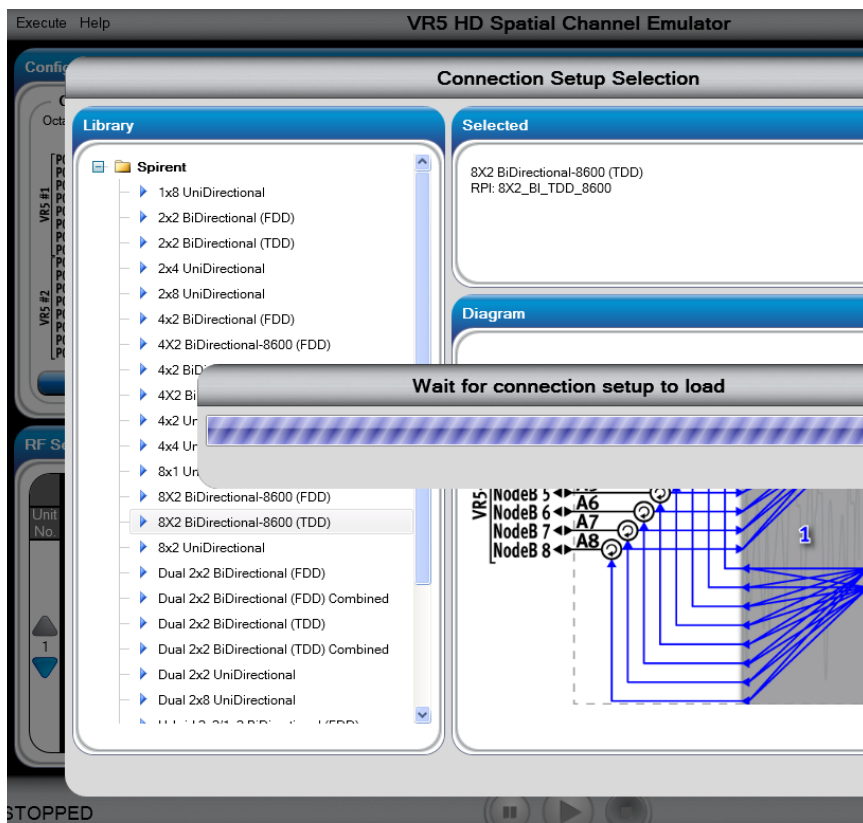


Figure 4-7: Loading Connection Setup

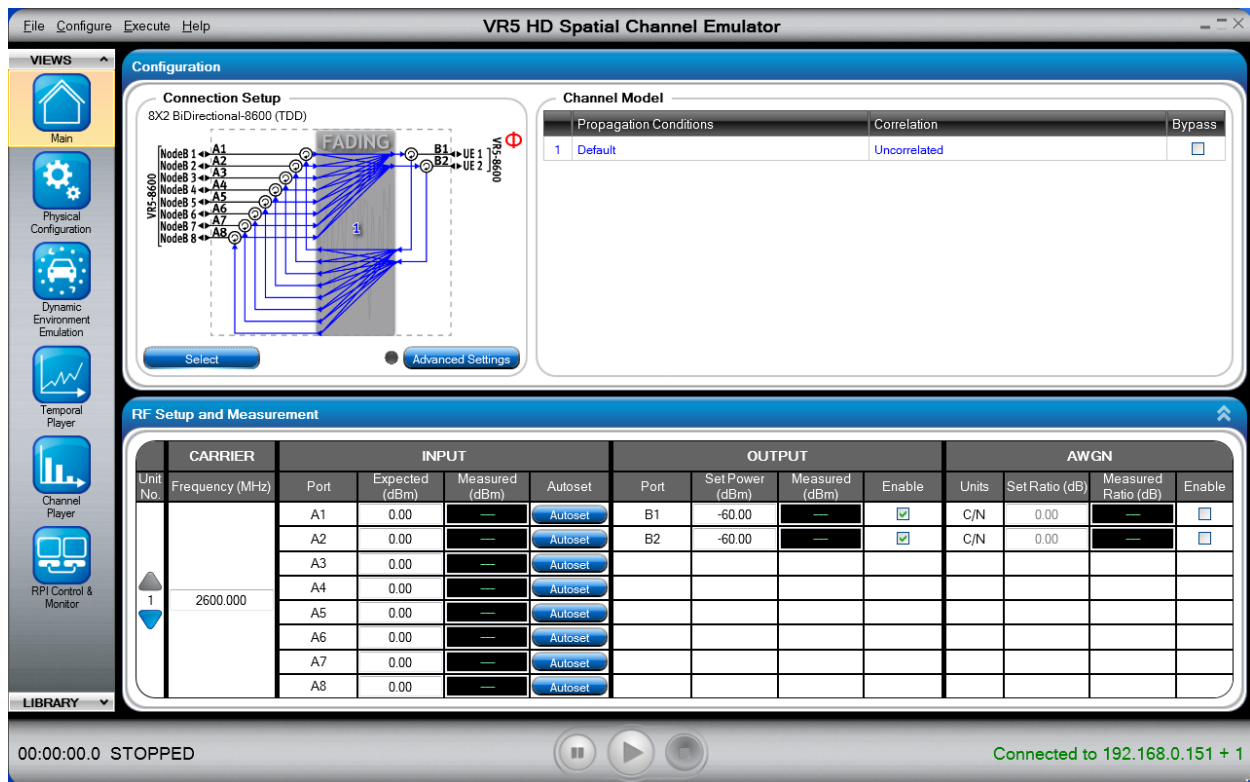


Figure 4-8: Main Window Upon Setup Completion

NOTE: In the Connection Setup diagram shown in Figure 4-8, the phi character (Φ) is red. This indicates that the Automatic calibration must be performed. This procedure is described in Section 4.2.2 on page 27.

11. Under the *RF Setup and Measurement* section, go to the *Output* columns.
12. Under the Set Power column, change the power level to **-25 dBm** for Port B1 and B2, as shown in Figure 4-9.

OUTPUT				
Autoset	Port	Set Power (dBm)	Measured (dBm)	Enable
Autoset	B1	-25.00	—	☒
Autoset	B2	-60.00	—	☒
Autoset				
Autoset				
Autoset				
Autoset				
Autoset				
Autoset				

Figure 4-9: Set Power for Initial Calibration

13. Under *Unit No.*, click the down arrow, as shown in Figure 4-10 to display the settings for VR5 unit 2.

The screenshot shows the 'RF Setup and Measurement' window. On the left, there are icons for 'Channel Player' and 'RPI Control & Monitor'. Below them is a 'LIBRARY' dropdown. The main area contains a table with columns: Unit No., Frequency (MHz), Port, Expected (dBm), Measured (dBm), Autoset, and Port. The 'Unit No.' dropdown is open, showing '1' with a down arrow icon next to it. An orange arrow points to this icon. The table shows settings for Unit 1, with Frequency 2600.000 MHz and various ports (A1-A8) and output ports (B1-B2). The 'Autoset' column has buttons for each row.

Figure 4-10: Unit Number Up and Down Arrow

14. The settings for Unit 2 display, as shown in Figure 4-11.

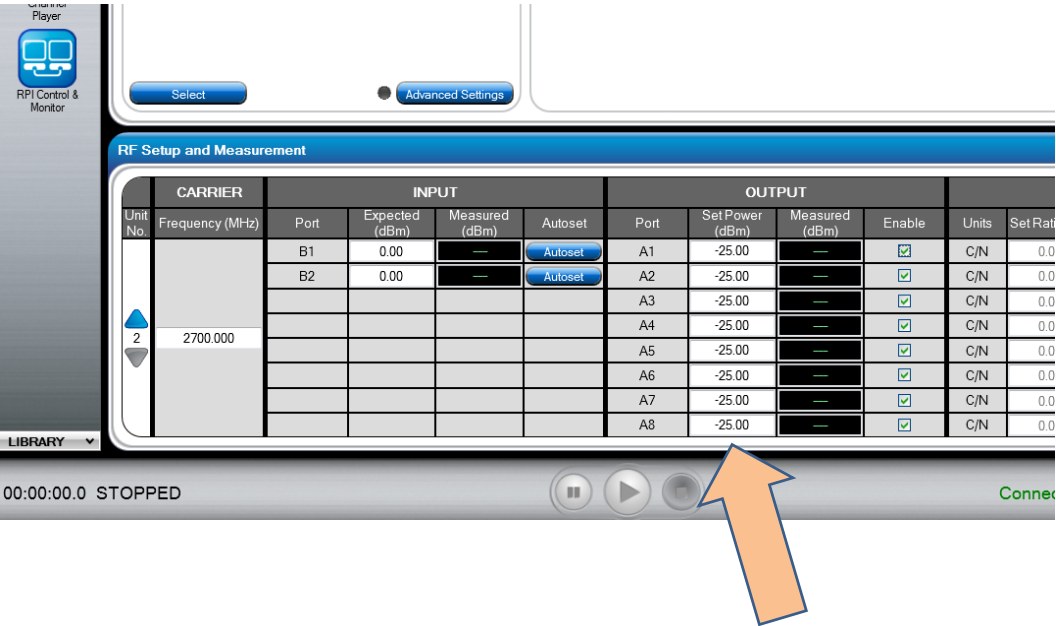


Figure 4-11: Unit 2 Power Settings

- 15. Set the Power Output Levels for A1 through A8 to **-25 dBm**, as shown in Figure 4-11.
- 16. Select **Execute>Phase Calibration>Initial Calibration**, as shown in Figure 4-12.

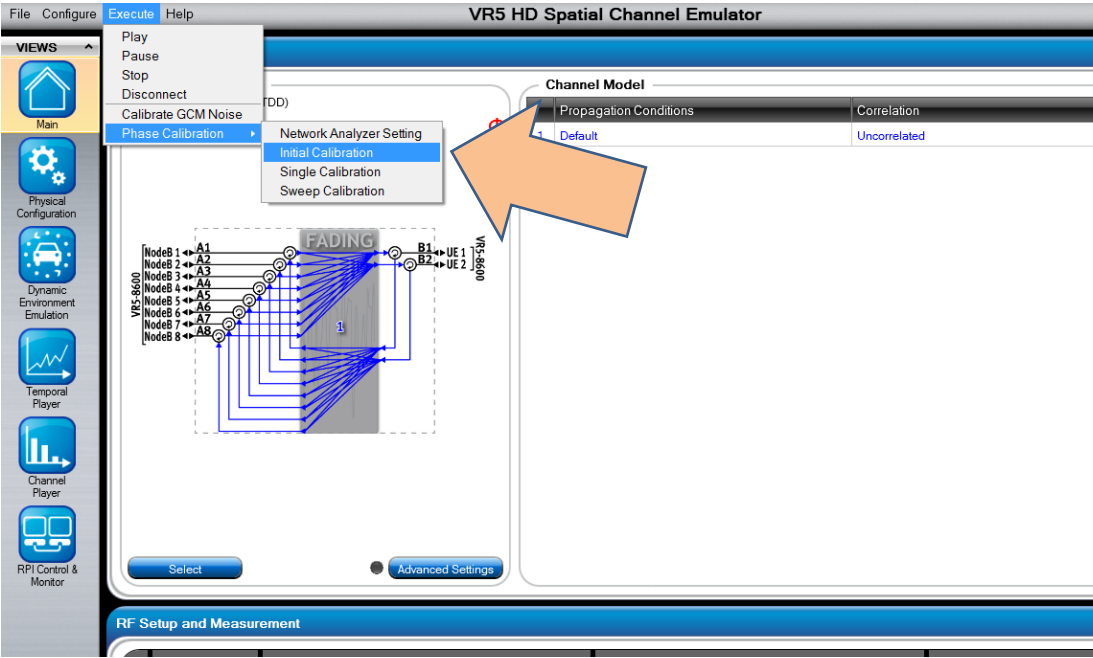


Figure 4-12: Execute Initial Calibration Menu Location

- 17. The Initial Phase Calibration window displays, as shown in Figure 4-13.



Figure 4-13: Initial Phase Calibration Window

18. Click **Next**.
The message in Figure 4-14 displays.

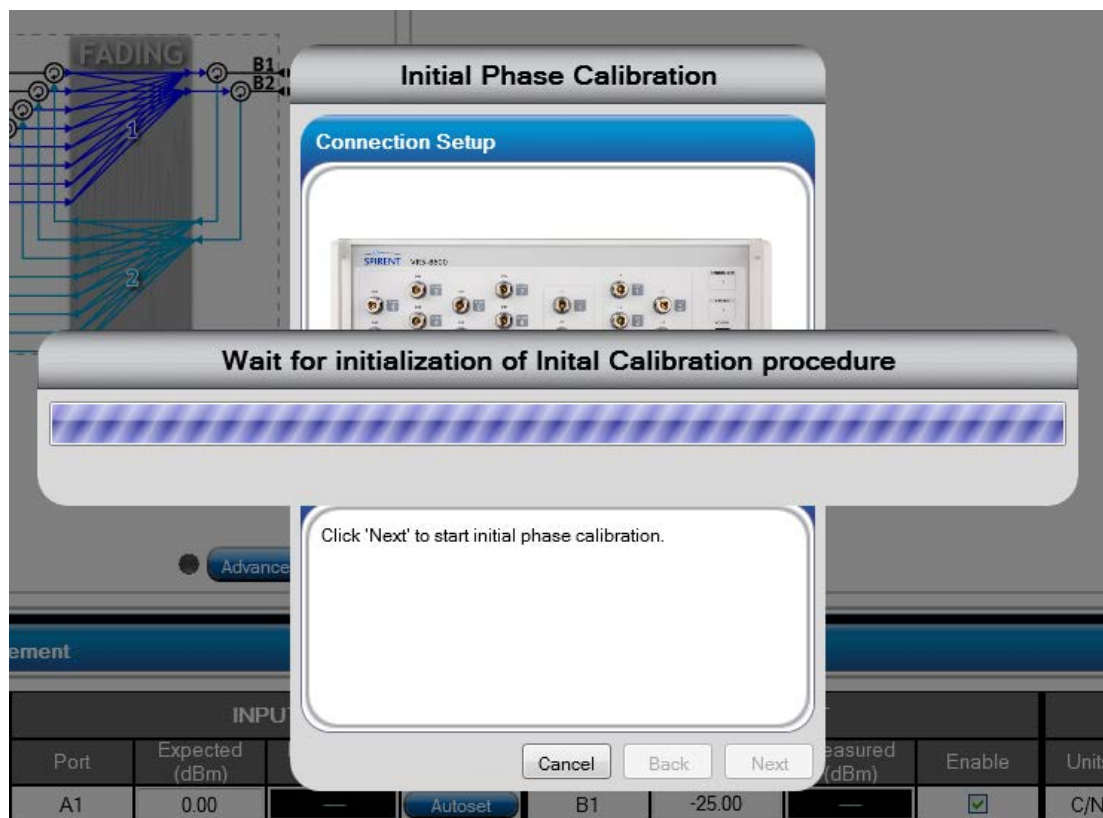


Figure 4-14: Initial Calibration Progress Indicator

19. When the test initialization is complete, a Connection Setup window displays, as shown in Figure 4-15.

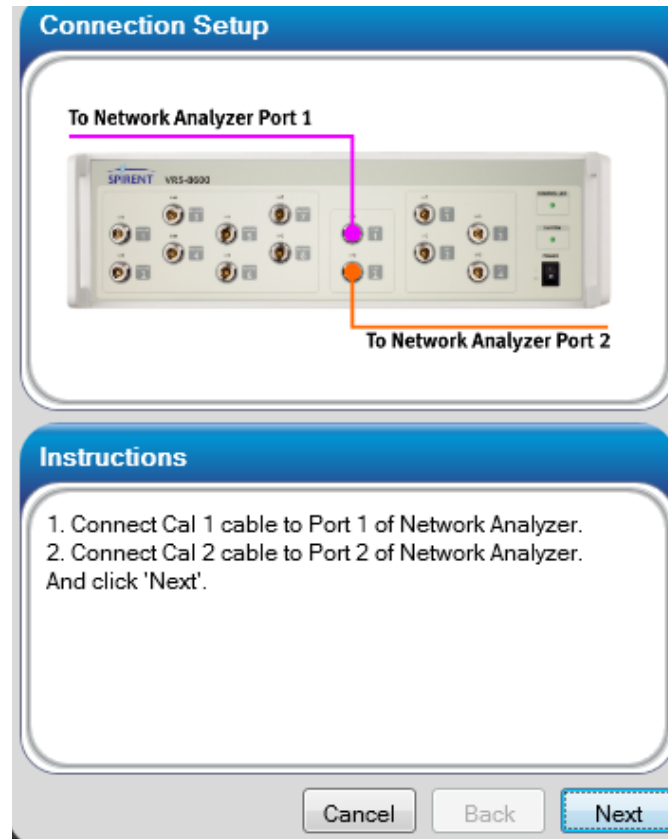


Figure 4-15: Connection Setup Window

20. Perform the Instructions given in the *Connection Setup* window and click **Next**, as shown in Figure 4-15.
21. The results of the measurement in the previous step displays, as shown in Figure 4-16.

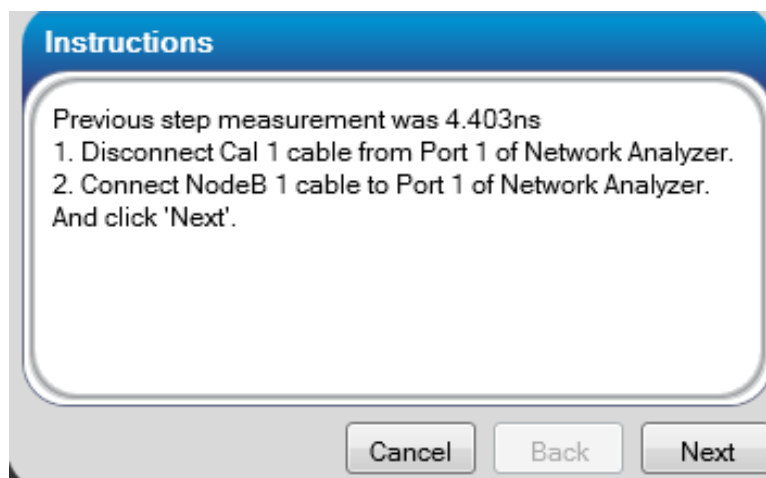


Figure 4-16: Connection Setup – Measurement Result

22. Perform the steps listed in Figure 4-16 and click **Next**.

23. Repeat this process for every cable connection in the test setup.

NOTE: The cable connected to Port 1 of the Network Analyzer is used in the calibration process for the NodeB portions of the test. The cable connected to Port 2 is used for the NodeA portions of the test.

24. Follow the steps described in the *Connection Setup* windows until the *Initial Phase Calibration* window displays, as shown in Figure 4-17.

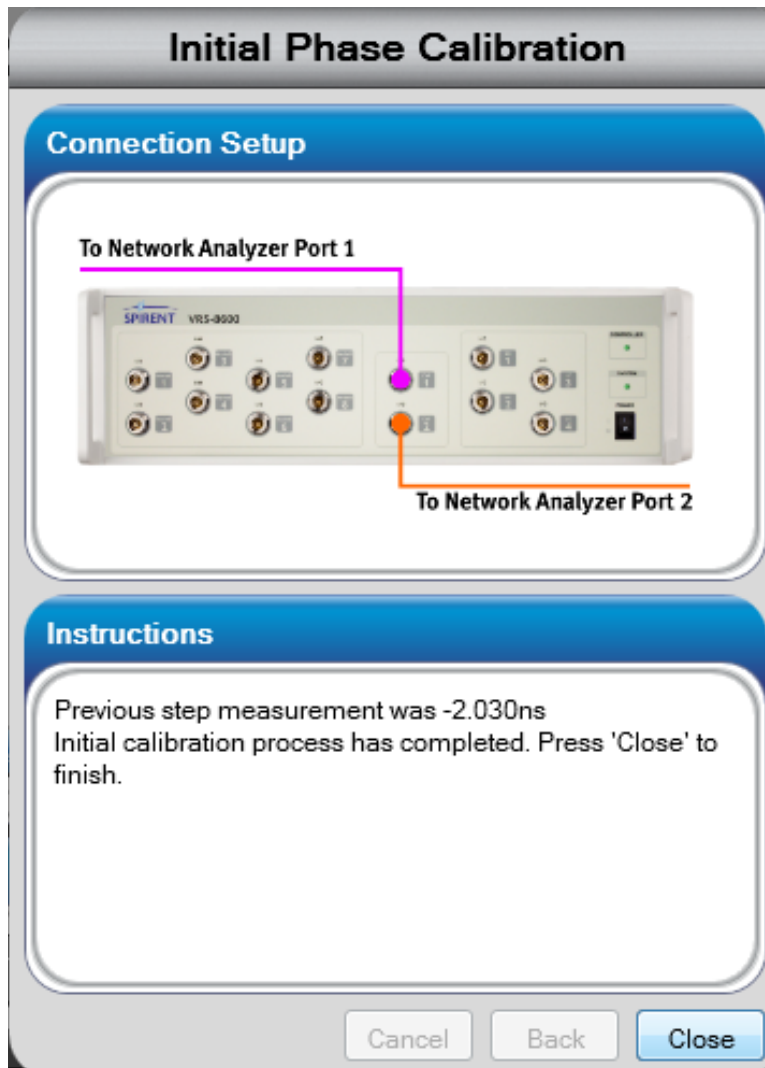


Figure 4-17: Initial Phase Calibration Window

25. Click **Close** to return to the *VR5 HD Main* window.

4.2.2. 8X2 BiDirectional Automatic Calibration

NOTE: In the Connection Setup diagram shown in Figure 4-8, the phi character (Φ) is red. This indicates that the Automatic calibration must be performed. This procedure is described in Section 4.2.2 on page 27.

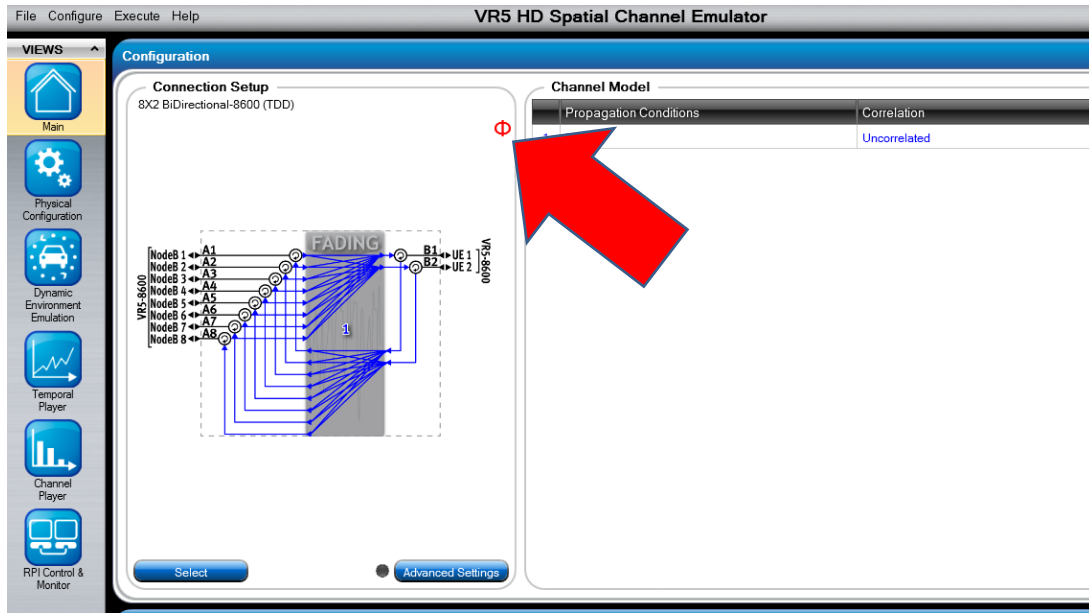


Figure 4-18: Red Φ Indicator Location (Automatic Calibration Required)

1. Select **Execute>Phase Calibration>Single Calibration**, as shown in Figure 4-18.

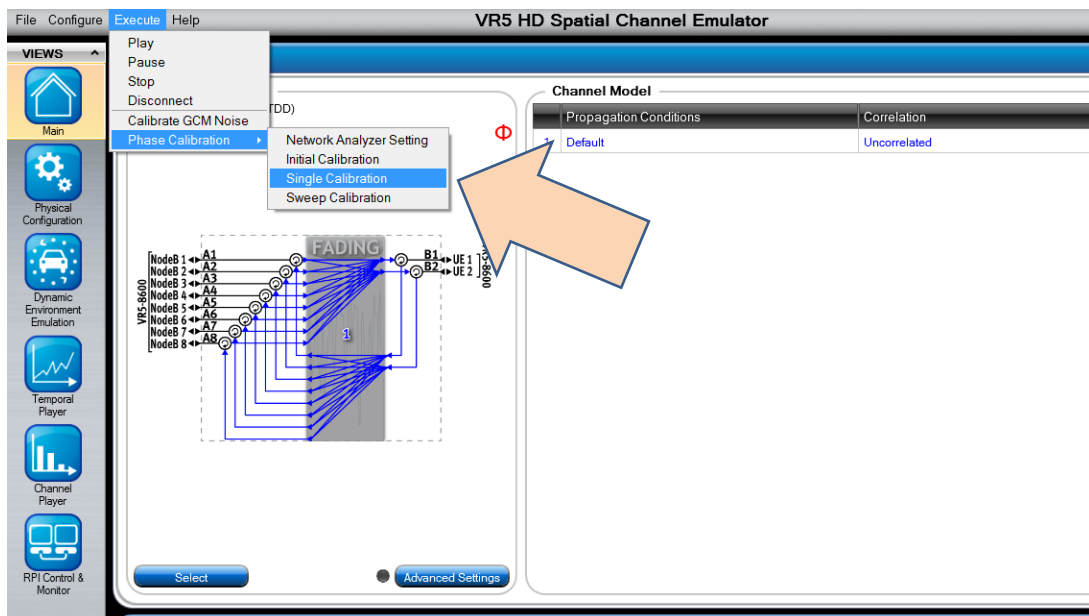


Figure 4-19: Automatic Calibration Menu Location

2. A *Progress* indicator displays, as shown in Figure 4-20.

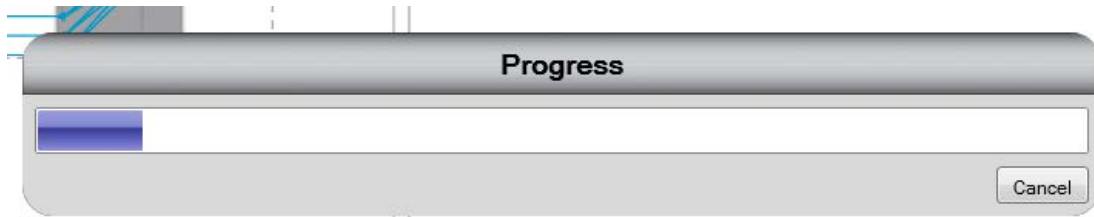


Figure 4-20: Automatic Calibration Progress Indicator

- When completed, the phi character (Φ) displays in green, as shown in Figure 4-21.

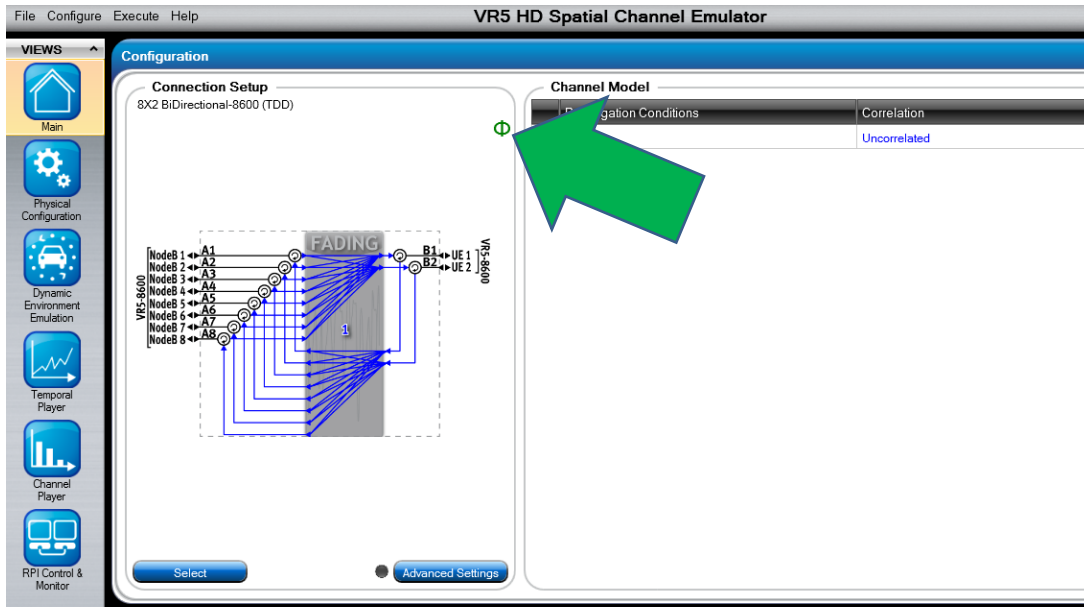


Figure 4-21: Green Φ – Automatic Calibration Successful

4.3. MB5 MIMO Beamforming Test System Specifications

The list below provides a summary of Beamforming Test System Specifications.

Frequency Range: 700-2700 MHz

Typical RF Path Loss (from NodeB connection on VR5-8600 to VR5 input or output): 6 dB at 2700 MHz

Typical RF Path Loss (from UE connection on VR5-8600 to VR5 input or output): 6 dB at 2700 MHz

Damage Input Power Levels:

- Maximum Input Power into any NodeB Port: 33 dBm
- Maximum Input Power into any UE Port: 33 dBm

Input Power Level Ranges for Proper Operation:

- Operational Input Power into any NodeB Port: -35 to 20 dBm
- Operational Input Power into any UE Port: -35 to 20 dBm

Typical Output Power Level Ranges in Proper Operation:

- Typical Operational Output Power from any NodeB Port: -116 to -30 dBm
- Typical Operational Output Power from any UE Port: -116 to -30 dBm

5. Appendix: VR5-8600 Technical Specifications

5.1. Overview

The Spirent VR5-8600 is a test configuration unit that is used with the Spirent MB5 MIMO Beamforming Test System. Its purpose is to provide RF measurement paths for the auto-phase calibration of the system. The auto-phase calibration measurements are performed using a vector network analyzer. The VR5-8600 is remotely controlled with a PC over Ethernet.

The following technical specifications describe the conditions under which the VR5-8600 is operated.

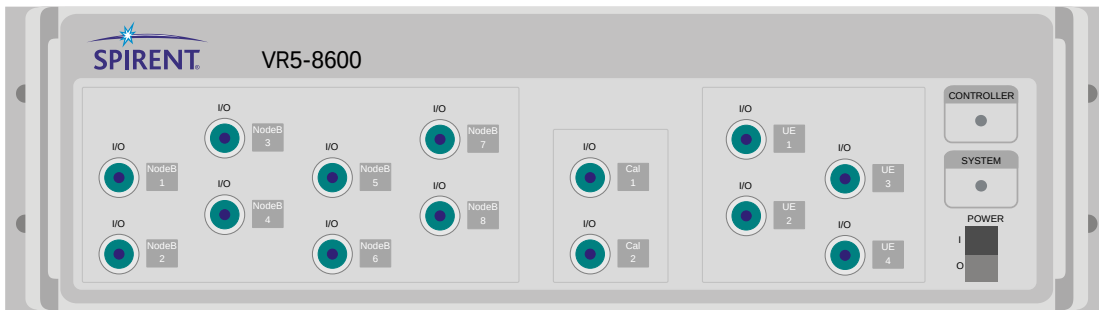


Figure 5-1: Front Panel View

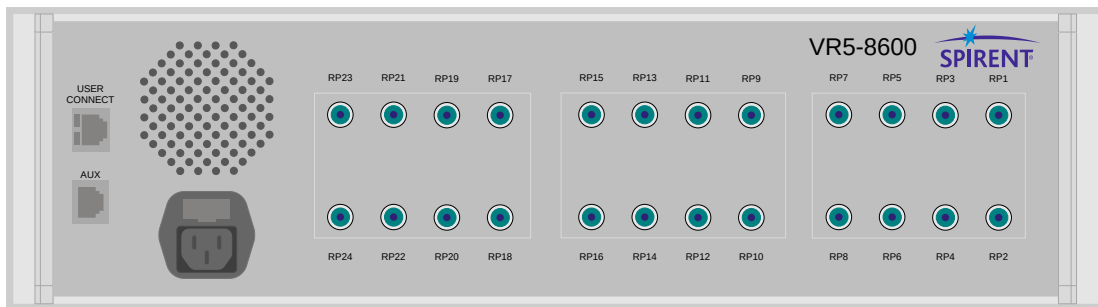


Figure 5-2: Rear Panel View

5.2. Connector Descriptions

For use with the Spirent MB5 MIMO Beamforming Test System that supports 8x4, 8x2, and 4x2 antenna arrays. The VR5-8600 RF connector configurations are provided below.

Front Panel RF Connections:

- NodeB 1 – Connects to port 1 of the NodeB antenna array
- NodeB 2 – Connects to port 2 of the NodeB antenna array
- NodeB 3 – Connects to port 3 of the NodeB antenna array
- NodeB 4 – Connects to port 4 of the NodeB antenna array
- NodeB 5 – Connects to port 5 of the NodeB antenna array; (for 8x4 and 8x2 systems only)
- NodeB 6 – Connects to port 6 of the NodeB antenna array; (for 8x4 and 8x2 systems only)
- NodeB 7 – Connects to port 7 of the NodeB antenna array; (for 8x4 and 8x2 systems only)
- NodeB 8 – Connects to port 8 of the NodeB antenna array; (for 8x4 and 8x2 systems only)
- Cal 1 – Connects to Port 1 of the vector network analyzer
- Cal 2 – Connects to Port 2 of the vector network analyzer
- UE 1 – Connects to the UE antenna terminal #1
- UE 2 – Connects to the UE antenna terminal #2
- UE 3 – Connects to the UE antenna terminal #3; (for 8x4 systems only)
- UE 4 – Connects to the UE antenna terminal #4; (for 8x4 systems only)

Rear Panel RF Connections:

- RP1 – Connection to VR5 for downlink
- RP2 – Connection from VR5 for uplink
- RP3 – Connection to VR5 for downlink
- RP4 – Connection from VR5 for uplink
- RP5 – Connection to VR5 for downlink
- RP6 – Connection from VR5 for uplink
- RP7 – Connection to VR5 for downlink
- RP8 – Connection from VR5 for uplink
- RP9 – Connection to VR5 for downlink
- RP10 – Connection from VR5 for uplink
- RP11 – Connection to VR5 for downlink

- RP12 – Connection from VR5 for uplink
- RP13 – Connection to VR5 for downlink
- RP14 – Connection from VR5 for uplink
- RP15 – Connection to VR5 for downlink
- RP16 – Connection from VR5 for uplink
- RP17 – Connection from VR5 for downlink
- RP18 – Connection to VR5 for uplink
- RP19 – Connection from VR5 for downlink
- RP20 – Connection to VR5 for uplink
- RP21 – Connection from VR5 for downlink
- RP22 – Connection to VR5 for uplink
- RP23 – Connection from VR5 for downlink
- RP24 – Connection to VR5 for uplink

5.3. RF Performance Specifications

Frequency Range:

- Cal 1 to any Node B port DC to 4000 MHz
- Cal 2 to any UE port DC to 4000 MHz
- Node B ports to RP ports 400 MHz to 4000 MHz
- UE ports to RP ports 400 MHz to 4000 MHz
- Max RF Input Power +30 dBm
- Isolation between RP Ports 18 dB Min
- Isolation between Node B ports 80 dB Min
- Isolation between UE ports 80 dB Min
- Isolation between Cal and Node B ports 80 dB Min
- Isolation between Cal and UE ports 80 dB Min
- VSWR 1.60:1 Max
- Insertion Loss Varies with frequency and selected path

5.4. Interface and Environmental Characteristics

Front Panel Indicators:

- System 1 LED
- Controller 1 LED

Power Requirements:

- Voltage 100-240 VAC (auto sensing)
- Frequency 50-60 Hz

Power:

- 100 Vac 18 Watts (Max)
- 120 Vac 19 Watts (Max)
- 240 Vac 35 Watts (Max)
- Fuse Type 2A, 250Vac, 5x20mm, Time Lag (Slo-Blo)
- Number of Fuses 2

Operating Environment:

- Temperature 0 to 40 degrees C
- Humidity 10% to 90%, noncondensing

Dimensions and Weight:

- Height (including feet) 5.9 inches
- Width 17.2 inches
- Depth (including handles) 22.9 inches
- Weight 31.5 pounds

Control Interfaces:

- Interfaces Provided RJ-45 Jack on rear panel for Ethernet USER CONNECT
- RJ-45 Jack on rear panel for RS-232 AUX

5.5. Rack Installation

The Spirent VR5-8600 is typically installed in an instrument rack along with the other equipment that makes up the Spirent MB5 MIMO Beamforming Test System. For more information about preparing the VR5-8600 for rack mounting, please refer to the Setup Guide that applies to your specific system and the instruction sheet MI5574 supplied with the VR5-8600 rack mount kit. The instructions for cabling and connecting the VR5-8600 are provided in the setup guide.

5.6. Bench-Top Installation

The Spirent MB5 MIMO Beamforming Test System, including the VR5-8600, is typically not used in a bench-top configuration. However, if the system is used this way, be sure that the power-cord connection is accessible at all times in case emergency disconnection is required. The cabling and connections are the same as for a rack mounted installation.

5.7. Care and Maintenance

5.7.1. *Cleaning*

Cleaning the Spirent VR5-8600 is typically not required. However, for good RF performance, it is important to keep the RF connectors on the front and rear panels free of dust and debris. Also, do not block the air exhaust vent on the rear panel.



VR5-8600 Fuse Replacement Procedure

The fuse is installed at the factory to match the most commonly used line voltage in the country of destination.

CAUTION: Disconnect from the supply before servicing

1. Locate the power entry module on rear panel.
2. Using a small screwdriver, pry out the fuse holder using the notch at the top of the power entry module. Refer to diagram below.



3. Pull the fuse from the fuse holder as shown above.
4. To reinstall, select the proper fuse and place in the fuse holder.

Part Number	Type
1800-3703	2A 250V Slow-Blow Fuse

5. Reinsert the fuse holder into the power entry module.

5.8. VR5-8600 Spécifications Techniques

5.8.1. Présentation

Le VR5-8600 de Spirent est une unité de configuration de teste qui est utilisé avec le MB5 MIMO Beamforming teste des systèmes de Spirent. Son but est de fournir des voies de mesure RF pour l'étalonnage automatique de phase du système. Les mesures de calibrage automatique de phase sont réalisées en utilisant un analyseur de réseau vectoriel. Le VR5-8600 est commandé à distance avec un PC via Ethernet.

Les spécifications techniques suivantes décrivent les conditions dans lesquelles le VR5-8600 est exploité.

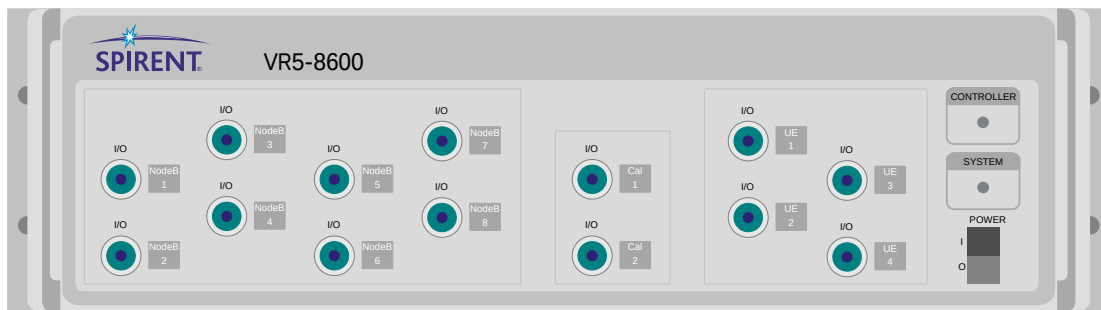


Figure 5-3: Vue du panneau avant

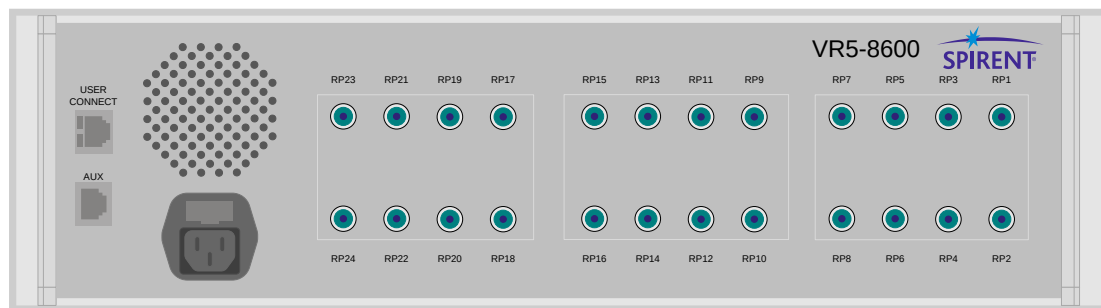


Figure 5-4: Vue du panneau arrière

5.9. Description des Connecteurs

Pour une utilisation avec le Spirent MB5 système MIMO Beamforming test qui prend en charge les réseaux d'antennes 8x4, 8x2 et 4x2, les connecteurs VR5-8600 RF sont configurés de la manière suivante:

Connexions du panneau avant RF:

- NodeB 1 – Connecte au port 1 de la NodeB réseau d'antenne
- NodeB 2: Connecte au port 2 de la NodeB réseau d'antenne
- NodeB 3: Connecte au port 3 de la NodeB réseau d'antenne
- NodeB 4: Connecte au port 4 de la NodeB réseau d'antenne
- NodeB 5: Connecte au port 5 de la NodeB réseau d'antenne; 8x4 and 8x2 systèmes seulement
- NodeB 6: Connecte au port 6 de la NodeB réseau d'antenne; 8x4 and 8x2 systèmes seulement
- NodeB 7: Connecte au port 7 de la NodeB réseau d'antenne; 8x4 and 8x2 systèmes seulement
- NodeB 8: Connecte au port 8 de la NodeB réseau d'antenne; 8x4 and 8x2 systèmes seulement
- Cal 1: Connecte au Port 1 de l'analyseur de réseau vectoriel
- Cal 2: Connecte au Port 2 de l'analyseur de réseau vectoriel
- UE 1: Connecte au UE du terminal de l'antenne #1
- UE 2: Connecte au UE du terminal de l'antenne #2
- UE 3: Connecte au UE du terminal de l'antenne #3; 8x4 systèmes seulement
- UE 4: Connecte au UE du terminal de l'antenne #4; 8x4 systèmes seulement

Arrière connexions RF du panel:

- RP1 – Connection au VR5 pour liaison descendante
- RP2 – Connection de VR5 pour liaison montante
- RP3 – Connection au VR5 pour liaison descendante
- RP4 – Connection de VR5 pour liaison montante
- RP5 – Connection au VR5 pour liaison descendante
- RP6 – Connection de VR5 pour liaison montante
- RP7 – Connection au VR5 pour liaison descendante
- RP8 – Connection de VR5 pour liaison montante
- RP9 – Connection au VR5 pour liaison descendante
- RP10 – Connection de VR5 pour liaison montante
- RP11 – Connection au VR5 pour liaison descendante
- RP12 – Connection de VR5 pour liaison montante
- RP13 – Connection au VR5 pour liaison descendante
- RP14 – Connection de VR5 pour liaison montante
- RP15 – Connection au VR5 pour liaison descendante
- RP16 – Connection de VR5 pour liaison montante
- RP17 – Connection de VR5 pour liaison descendante
- RP18 – Connection au VR5 pour liaison montante

- RP19 – Connection de VR5 pour liaison descendante
- RP20 – Connection au VR5 pour liaison montante
- RP21 – Connection de VR5 pour liaison descendante
- RP22 – Connection au VR5 pour liaison montante
- RP23 – Connection de VR5 pour liaison descendante
- RP24 – Connection au VR5 pour liaison montante

5.10. Spécifications du Performance RF

Gamme de frequencys:

- Cal 1 à n'importe quel port de Node B DC à 4000 MHz
- Cal 2 à n'importe quel port d'UE DC à 4000 MHz
- Node B ports à RP ports 400 MHz à 3000 MHz
- UE ports à RP ports 400 MHz à 3000 MHz
- Puissance d'entrée max RF +30 dBm
- Isolement entre RP Ports 18 dB Min
- Isolement entre Node B ports 80 dB Min
- Isolement entre UE ports 80 dB Min
- Isolement entre Cal et Node B ports 80 dB Min
- Isolement entre Cal et UE ports 80 dB Min
- VSWR 1.60:1 Max
- Perte d'insertion Varie avec la fréquence et le chemin sélectionné

5.11. Interface et Caractéristiques d'environnement

Indicateurs des panneaux avant:

- Système 1 LED
- Contrôleur 1 LED

Exigence de puissance:

- Voltage 100-240 VAC (auto sensing)
- Fréquence 50-60 Hz

Puissance:

- 100 Vac 18 Watts (Max)
- 120 Vac 19 Watts (Max)

- 240 Vac 35 Watts (Max)
- Type de Fusible 2A, 250Vac, 5x20mm, décalage (Slo-Blo)
- Numéro de Fusible 2

Environnement d'Exploitation:

- Température 0 à 40 degrés C
- Humidité 10% à 90%, sans condensation

Dimensions and Poids:

- Poids (inclue le "feet") 5.9 inches
- Largeur 17.2 inches
- Profondeur (inclue les "handles") 22.9 inches
- Poids 31.5 pounds

Interfaces de contrôles:

- Interfaces Fournies RJ-45 Jack sur le panneau arrière pour Ethernet
USER CONNECT
- RJ-45 Jack sur le panneau arrière pour RS-232 AUX

5.12. Installation

5.12.1. Installation dans le Cabinet

Le Spirent VR5-8600 est généralement installé dans un rack instrument avec les autres équipements qui composent le Spirent MB5 système MIMO Beamforming test. Pour plus d'informations sur la préparation du VR5-8600 pour montage en rack, s'il vous plaît se référer au Guide d'installation qui s'applique à votre système spécifique et la feuille d'instruction MI5574 fourni avec le kit VR5-8600 rack. Les instructions pour le câblage et la connexion du VR5-8600 sont fournis dans le guide de configuration.

5.12.2. Installation sur le Banc

Le Spirent MB5 MIMO Test System Beamforming, y compris le VR5-8600, n'est généralement pas utilisé dans une configuration de paillasse. Toutefois, si le système est utilisé de cette façon, assurez-vous que la connexion cordon d'alimentation est accessible en tout temps en cas de déconnexion d'urgence est nécessaire. Le câblage et les connexions sont les mêmes que pour un montage en rack d'installation.

5.13. Entretien et Soins

5.13.1. Nettoyage

Nettoyage de la Spirent VR5-8600 n'est généralement pas nécessaire. Toutefois, pour des performances RF bon, il est important de garder les connecteurs RF sur les panneaux avant et arrière de la poussière et les débris. En outre, ne pas bloquer le conduit d'évacuation de l'air sur le panneau arrière.



VR5-8600 Procédure de Remplacement de Fusible

Le fusible d'origine est dimensionné selon le voltage le plus courant dans le pays de destination.

Attention – Déconnecter de l'alimentation avant l'opération

Localiser le module d'entrée d'alimentation sur le panneau arrière.

Avec un petit tournevis, enlever le support à fusible en utilisant l'encoche au sommet du module d'entrée d'alimentation (voir le schéma ci-dessous).



Enlever le fusible du support comme montré ci-dessus.

Pour remise en état, sélectionner le fusible approprié et le placer sur le support.

Numero du Composant	Type
1800-3703	2A 250V Slow-Blow Fuse

Réinstaller le support de fusible dans le module d'entrée d'alimentation.